Science-Fiction and Cognition

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SCIENCE-FICTION AND COGNITION

Science-fiction (SF) is a paradoxical genre insofar as it combines realism (scientific verisimilitude) and fantasy (free speculations about estranged worlds). It represents a kind of impossible marriage between reason (science) and emotion (fiction). This tension is evoked by an image of the android Roy Batty from Ridley Scott's film *Blade Runner* (1982), which appears on the front cover of a collection of essays edited in 1999 by Carl Plantinga and Greg Smith, titled *Passionate Views: Film, Cognition, and Emotion*. Thus SF has a cognitive dimension, which can be linked primarily to its scientific ideology, as well as an affective dimension, that expresses itself through feelings of estrangement and wonder. How can one account for the semiotic mechanisms that produce meaning and emotion in SF film, in a way that explains the interaction between these two apparently antithetical components? This essay will compare a selection of film theories from structural and pragmatic semiology, with the cognitive psychology model employed by scholars such as David Bordwell and Torben Grodal, as a means of gauging the scientific value of these two basic approaches in determining SF film's generic identity.

"SF film is a genre characterized by a thematic focus on science and technology and on their potential effects on contemporary society, whose main formal device is an imaginative framework alternative to the author's empirical environment, and one that adopts a scientific ideology associated with the arrival of the industrial age" (Mather 1997, 134). This is how I once defined SF film, from a semio-pragmatic perspective. The genre has its own reading protocols, emerging from a social sphere that all competent readers will apply according to their own knowledge. It seems reasonable to assume that a cognitive psychology of film could contribute to genre theory, regarding the viewer's activity, particularly if one considers SF's scientistic ideology.

Superficially, the cognitive approach to film might indeed strike one as tailor-made to explain the nature of SF film. First, cognitive psychology is an experimental science whose hypotheses are verifiable empirically, which should allow the analyst to establish precise links between a film's textual features and the viewer's cognitive processes. Secondly, SF is a narrative genre whose discourse broadly endorses the scientific episteme, and that represents a kind of thought experiment based on a fictional hypothesis. However, a closer analysis of the concept of cognition in SF reveals that the connection between cognitive psychology and SF is not as helpful as one might think.

From a strictly textual perspective, SF's thought experiment is embodied by the plot. It is the plot that articulates the experiment's spatial, temporal and actantial links, links that are activated in terms of paradigmatic choices. These choices are also meant to be falsifiable in all of the plot's narrative articulations, every transitional stage between events, or steps in the fictional experiment. The plot's overall form thus adopts the structure of a thought experiment similar to a parable (Suvin 1988, 201).

Two problems come to the fore as soon as one examines SF plots more closely. In terms of "actantial articulations" and "paradigmatic choices," it is difficult to demonstrate that SF plots reveal a more logical or "scientific" form than the plots of other genres. In fact, if one removes the scientific theme from SF narratives, it becomes clear that their plot structures are relatively conventional, and can readily be analyzed by structural methods such as Claude Brémond's binary logic. In his essay *La Logique des possibles narratifs*, Brémond describes the progression of plots in terms of whether or not the narrative goal is attained, an immanent characterization that can doubtless be applied to the viewer's cognitive activity (1966, 67). In any case, nothing here distinguishes SF from other narrative genres.

The second problem concerns the analogy between SF's narrative structure and the experimental method. One quickly realizes that while the analogy may have a heuristic value, SF narratives do not really exemplify the scientific method, but refer instead to the genre's ideology. This positive ideology may be understood in a pragmatic sense as a presuppositional context, but it would never be the case that SF applied in a strict fashion the principles defined by Karl Popper, for instance, in his famous book on epistemology,

titled *Conjectures and Refutations*. The "axis of desire" is an integral part of the genre's narrative structure, and remains outside the narrowly cognitive frame of disinterested science.

When one speaks of cognition in SF, it is in fact the genre's thematic dimension as well as its scientistic ideology. These aspects are part of the genre's intertextual horizon, and are thus pragmatic concerns. From the perspective of cognitive science and the question of information processing, a genre's reading protocols can only be understood as "top-down" procedures. One could list a number of cognitive schemata that may characterize SF film, while questioning the scientific novelty of this approach when compared with the already established theory of SF (cf. Suvin, Broderick, Angenot, Sobchack, Landon, etc.)

Borrowing categories defined by the psychologist Reid Hastie, David Bordwell describes various types of schemata that guide the viewer's cognitive activity, in his book *Narration in the Fiction Film*. These schemata emerge as much from real-world experience as from literary intertextuality (Bordwell 1985, 34--6). Moving from the particular to the general, he begins with "prototypes," that is to say, schemata that allows one to identify specific actants, goals and locations. One may recognize the concepts of structuralist theory, such as informants and actants. The prototypes unique to SF will normally reflect what many genre theorists consider to be SF's syntactic and semantic matrix, estrangement and scientific cognition (Malmgren 1991, 23--31).

SF is characterized in particular by the use of certain kinds of "heteromorphic" actants, namely artificial or extra-terrestrial life forms (Bouchard 1993, 88). In the category of cybernetics and artificial intelligence, significant distinctions should be made between robots, androids, cyborgs and computers. The goal is usually to examine the nature of humanity. Is a cyborg still a man if he uses artificial prosthetics? At the dawn of the third millennium, it is becoming increasingly difficult for people to separate themselves from their wrist-watches and their cell phones, not to mention contact lenses and pacemakers. Are they less human? Should humanity be defined instead by emotions or consciousness? What about actants such as HAL 9000 in *2001: A Space Odyssey* (1968, Stanley Kubrick), V'Ger in *Star Trek: The Motion Picture* (1979, Robert Wise), Roy Batty in *Blade Runner* (1982, Ridley Scott), or David in *A.I.* (2001, Steven Spielberg)?

As for different biological lifeforms, we can note prototypes such as mutants, those creatures of the atomic age who often become giants or gain extra-sensory powers, sometimes as a result of post-Hitlerian eugenics via genetic manipulations, in a film such as *Gattaca* (1997, Andrew Niccol). Animals may acquire consciousness in *Planet of the Apes* (1967, Franklin Schaffner), vegetal lifeforms threaten humanity in the *Invasion of the Body Snatchers* (1956, Don Siegel), residents of Moonbase Alpha are confronted with sentient minerals in the television series *Space: 1999* (1976, *All That Glisters*), and Captain Kirk is captured by a gaseous entity in the *Star Trek* series (1967, *Metamorphosis*). Among the different actants one finds in SF are the symbiots, beings combining at least two life-forms, such as the character Dax from the series *Star Trek: Deep Space Nine*, and collective entities that channel their mental energies in order to create a gestalt, such as the intelligent ants in the film*Phase IV* (1974, Saul Bass).

SF locations are situated as much on Earth, in a utopic or dystopic future, as they are on distant planets. The post-nuclear environment of films such as *A Boy and His Dog* (1975, L.Q. Jones), *The Road Warrior* (1981, George Miller), and *Terminator* (1984, James Cameron) has been studied by Hélène Puiseux, in her monograph titled *L'Apocalypse nucléaire et son cinéma*. Dystopias also include the Malthusian scenario of the polluted and overpopulated world that one finds in *Soylent Green* (1973, Richard Fleischer), and worlds overrun by computers in *Colossus: The Forbin Project* (1970, Joseph Sargent) or *THX-1138* (1971, George Lucas).

Another category of estranged locations concerns parallel universes. The protagonists of the film *Journey to the Far Side of the Sun* (1970, Robert Parrish) are confronted with planet Earth's double, hidden behind the Sun, and in one *Star Trek* episode (*The Alternative Factor*, 1967), the meeting between a character and his anti-matter double could be fatal to the universe. The self-contained city, above or underground, is featured in *Logan's Run* (1976, Michael Anderson), and the city in outer-space, whether a ship or a station, is one of the most common locations in SF.

The second type of cognitive schema mentioned by Bordwell is the template schemata (1985, 34-5). It concerns mainly the knowledge of standard narrative patterns such as Roland Barthes' hermeneutic code. In

my view, SF films broadly use the same narrative patterns as any other genre, except that they are coloured by a particular interpretive mindset that reflects the genre's thematic and ideological specificity, notably from the creation of a fictional world that is estranged and coherent, different and realistic. For instance, one of SF film's characteristic template schemata is the realist device of the didactic dialogue.

The character-narrator can be one variety of the didactic dialogue, an embedded version of narrative discourse in which two fictional characters function as intradiegetic intermediaries for the enunciation, representing the narrator and narratee. In a scene from the film *Event Horizon* (1997, Paul W.S. Anderson), Sam Neill plays a scientist who uses his status as an expert to give other, less knowledgeable characters on board the spaceship a lesson in theoretical physics. Another version of the didactic dialogue is the mise-en-abyme, a figure in which the narration is mediated by using a diegetic radio or television setup, in particular, which usually involves frames within frames. A scene from the film *Jurassic Park* (1993, Steven Spielberg) uses an animated film designed for theme park visitors in order to explain the cloning of prehistoric animals in a somewhat less didactic fashion.

Bordwell adds that viewers are also aware of film style conventions (1985, 36--7). In that respect, estrangement in SF is largely the result of special visual effects that create moments of spectacle, effects that define SF film as a genre according to Brooks Landon (1992, 63). From a cognitive perspective, Stephen Prince provides the example of brightly lit close-ups of faces that express a sense of wonder, which in SF film often (though not always) evokes an extra-terrestrial presence (1997, 367). We might add the cognitive revelation, resulting from a reframing that reveals an unseen object off-frame. This stylistic schema tends to offer a wider view: moments of cognitive revelation in SF films are often instances when the camera physically pulls back from the scene. One begins with a medium or a close shot of an established character or object, followed by a framing that situates the object in a larger spatial context, in a long shot. This context is usually surprising, different from the spectator's worldview. The key feature of this schema is the physical distancing that reflects in a literal way the critical, and therefore cognitive, distance that the viewer is encouraged to adopt with respect to the fictional events.

A famous example is the closing shot from the film *Solaris* (1972, Andrei Tarkovsky), which changes the setting of the character's nostalgic return to his birthplace, to an island floating on the ocean planet of Solaris. An equally impressive backward movement from the film *The Arrival* (1996, David Twohy) reveals surprising weather conditions when a scientist examines a wheat field on the North Pole. An astronomical view of the Milky Way is featured at the beginning of the film *Contact* (1997, Robert Zemeckis), as we leave behind a family scene in order to consider our place in the galaxy. A similar backward movement ends the film *Men In Black* (1997, Barry Sonnenfeld), revealing that our universe is nothing more than a game of marbles played by two alien beings.

The third and final type of cognitive schema mentioned by Bordwell is the procedural schema (1985, 36). These are reading protocols that use template and prototype schemata in order to organize the information according to specific kinds of determinations. It is interesting to note that, in the same way that he borrowed examples of prototype schemata (actants and informants) from structural narratology, Bordwell takes the idea of "thematic motivation" from the Russian formalist Boris Tomachevsky, in order to describe the kinds of determinations used by procedural schemata (1965, 282).

The first kind of procedural schema is the "compositional motivation," concerning a story's logical causality and the functional value of its component parts. The second type is the "realistic motivation," that narrative theorist Marie-Laure Ryan has defined as the "principle of minimal departure:" unless stated otherwise, fictional worlds conform as much as possible to the reader's representation of the actual world (Ryan 1991, 51). The third type is the "transtextual motivation," essentially the genre-effect described by film scholar Marc Vernet (1983, 105). This concerns generic intertextuality, a horizon of expectations created by other texts within the same genre. Both the realist and transtextual motivations contribute to narrative fiction's verisimilitude, a process that has been identified well before the advent of cognitive film theory. The last kind of procedural schema is the "artistic motivation," which usually reveals the enunciation from the use of reflexive devices.

The transtextual motivation is not a recent idea in genre theory, and one could describe its modus operandi in SF thanks to the notion of the conceptual lexicon, the "omega-text"?(Broderick 1995, 57) or the "absent

paradigm" (Angenot 1978, 78), which ensures a reality-effect for readers familiar with the genre's conventions, in particular. Not only has SF's thematic repertoire been well inventoried by encyclopedic studies (Ash, 1977 and Clute, 1993, for instance), but the genre's specific semiotic mechanisms have already been explained in a satisfactory manner. In what way can cognitive theory shed new light on SF film?

Phenomenologically, SF film is not limited to its cognitive or scientific aspect. Indeed, SF's cognitive estrangement also includes an affective dimension, namely the sense of wonder that accompanies moments of spectacle or cognitive revelations, along with the application of a new paradigm to our representation of reality. Albert Wendland makes a useful distinction between the pleasures of cognition and of estrangement, pleasures that nevertheless combine to form SF's poetic function. The pleasure of estrangement refers to escapist and exoticist desires that SF often satisfies. Cognitive pleasure occurs when the fictional world reveals to the viewer something about the real world: it is an allegorical enlightenment, since the revelation is indirect, a pleasure of discovery (Wendland 1985, 52).

Can the cognitive approach teach us something about the production of affect in SF film? In 1997, Stephen Prince argued that one of the main shortcomings of cognitive film theory was its bracketing of the emotional dimension of the viewer's experience (371). According to Bordwell, this is not an oversight, but simply a scientific decision to focus exclusively on those aspects of semiosis that do not require an account of the viewer's emotional responses (1985, 30). This methodological caveat appears to define the cognitive approach. It proposes a "piecemeal" approach (Carroll 1988, 8), that is to say, research dedicated to specific phenomena described by Bordwell as "middle-level" (1996, 26â€“30).Does this mean that cognitive theory is only useful for, or able to explain some meaning-bearing phenomena and not others? This is precisely what Stephen Prince suggests (1997, 371), although those who champion cognitivism imply that, while a single, all-encompassing cognitive theory may not be adequate, a cognitive approach finely-tuned to localized problems may eventually answer many of our questions about the cinema (Carroll 1988, 231--34). It is not entirely clear what distinguishes the "theory" from the "approach," but recent monographs on emotion in film from a cognitive perspective appear to confirm the totalizing aspirations of the cognitive approach (the return of the repressed?), apart from being intrinsically interesting analyses in themselves (cf. Plantinga, Grodal). Also, it can seem surprising for cognitivists to reject the semiotic model, given their formalist leanings. Even though several theorists have clearly demonstrated the cognitive dimension of film semiology (Colin 1992, and Buckland, 2000), cognitivists still think that semiology is handicapped by its linguistic origin.

Regarding cognition and emotion in film, one of the most advanced theories appears to be Torban Grodal's. He endorses the holistic hypothesis, according to which cognition and emotion are inextricably linked, in contrast with the aforementioned "piecemeal" approach (Grodal 1997, 2). Any fictional or non-fictional situation requires a cognitive evaluation (researching the situation's causes or motives) as well as an affective evaluation (researching personal preferences regarding survival) (Grodal 1997, 51). The emotional evaluation provides a frame (preferences) that guides the cognitive analysis, and this analysis serves as a tool that allows for the preferences to be acted upon (Grodal 1997, 87).

As for narrative fiction, cognitive pleasure arises from a complementary system of two types of motivations: the telic motivation (guided by a goal or telos) and the paratelic motivation (focused on the enunciative process). The telic system is strictly cognitive: it is stimulated by a dysphoric lack of narrative information, whereas a surplus of information will be euphoric (narrative closure, for instance). In contrast, stimulating the paratelic system will be euphoric (the pleasure of suspense), whereas a lack of stimulation is dysphoric (a boring narrative) (Grodal 1997, 101).

Grodal then proposes a generic typology based on various modes of spectatorial identification with the diegesis and various types of emotional effects (Grodal 1997, 157). He lists eight generic categories: tragedy and melodrama, horror, schizoid horror, lyrical forms, metafiction, canonical action and adventure genres, comedy, and obsessional paratelic forms (Grodal 1997, 161). These genres are classified according to their mode of emotional reception: active or passive spectator on the one hand, and close or distant diegetic identification on the other.

Grodal's model is impressive, but we may note that SF is not included as such in his generic system. In fact, Grodal acknowledges the system's schematic aspect: it seeks only to identify basic generic prototypes,

in terms of cognitive and affective identification structures. Thus, one would need to follow a two-step procedure, by first situating SF within Grodal's system, as a specific variety of the spectator's identification with the fictional world. This would doubtless result in a partial definition of the genre, explaining some of its semiotic and affective characteristics. The second step would require a fine-tuning of Grodal's system in order to account for SF's generic specificity, in terms of the spectator's unique cognitive processes.

Given the broad nature of his analysis, Grodal admits that he must bracket, for methodological reasons, the issue of the spectator's familiarity with specific generic conventions (1997, 163). This is unfortunate for our purposes, since SF's verisimilitude relies in part on a viewer who is reasonably competent, who knows how to apply the genre's conventions, and possesses some basic scientific knowledge, in order to fully enjoy the genre's cognitive and affective rewards. One can imagine a viewer unfamiliar with the distinction between an android and a cyborg, and making an inaccurate identification with the fictional character: the protagonist may not be a human being enhanced with bionic prosthetics, but instead a robot, a walking computer.

The scientific value of Grodal's model seems incontrovertible, and it is likely that building upon its premises in a strategic fashion would allow it to explain science-fictional semiosis more precisely. For example, how can one describe the genre's much-touted "sense of wonder" from a cognitive perspective? Although they don't address SF specifically, Ed Tan and Nico Frijda have analyzed a type of emotion that they call the "sentiment," which is characterized by a feeling of powerlessness when one is confronted by an overwhelming fictional event (1999, 55). The two authors mention three main themes that trigger this sentimental feeling: the separation-reunion, justice threatened, and the marvelous. This third theme is of interest for SF.

According to Tan and Frijda, the marvellous may be the result of a desire for fusion with a stimulus perceived as imposing or even transcendent, and in any case larger and more important than oneself (1999, 62). It is the aesthetic concept of the sublime, revisited by cognitivism. One thinks of spectacular imagery illustrating the power of nature, or perhaps a gigantic monument or an alien spaceship such as the one in the closing sequence of *Star Trek: The Motion Picture* (1979, Robert Wise). The marvellous may trigger a positive or a negative response, a fascination for the stimulus and even a sense of euphoria, or else a feeling of anxiety and intimidation when confronted with an overwhelming danger, such as the Death Star in *Star Wars: A New Hope* (1977, George Lucas).

The advantage of Tan and Frijda's middle-level approach is that it can be more precise than Grodal's broad considerations, although it also ignores other semiotic phenomena. Combining these two approaches might offer a solution. SF's sense of wonder rests not only on the desire to join a phenomenon greater than on self, but also on the cognitive pleasure of recognition: it is a matter of placing the diegesis in a larger context, namely the spectator's representation of the real world, thanks to the fictional system's allegorical connection to the realist referent. The aforementioned backward movements of the cognitive revelation trope are physical embodiments of a conceptual or philosophical movement, and represent SF's spectatorial pleasure, a combination of emotional fascination and a cognitive eureka. Estrangement is therefore a fundamental feature of SF, a genre that may be considered as a fictional version of a thought experiment, but one that always expects the viewer to adopt the relevant reading protocols, particularly its scientistic ideology.

In conclusion, we may note that in terms of its descriptive power, the cognitive concept of narrative schema does not offer anything new for genre theory, a theory that, for the record, does not concern the classification of films, but instead identifies reading protocols. Semiology still enjoys a lead over cognition on this issue, if one thinks of the work of Jean-Marie Schaeffer and Rick Altman (Schaeffer, 1989 and Altman, 1999). As for the emotional dimension, psychoanalytic theory focuses mostly on the question of identity that can be of interest for SF (human, alien and technological selves and others), but the generic specificity of films analyzed according to this approach tends to be overlooked. For this reason, the cognitive model is promising, and Grodal's lead should be followed. Broadly speaking, cognitive theory's greatest potential concerns its experimental nature and its projected explanatory power. It is the psychological interaction between the various types of narrative, stylistic and affective schemas that needs to be examined, which in principle could eventually allow cognitive theory to overtake film semiology.

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